

## SHORING ADJACENT TO UNION PACIFIC RAILROAD COMPANY TRACKS

### Railroad Guidelines

To expedite the review process of shoring plans by the Union Pacific Railroad Company (UPRR), the drawings submitted by the contractor must adhere to the requirements of the UPRR. Until the UPRR issues new guidelines, the design of shoring systems for all UPRR and former Southern Pacific Transportation Company (SPTC) lines shall be in accordance with the SPTC shoring guidelines titled GUIDELINES FOR DESIGN OF SHORING IN CONNECTION WITH HIGHWAY GRADE SEPARATION CONSTRUCTION, with the exceptions noted herein. Refer to Trenching and Shoring Memo 3 (04/96) for a copy of these guidelines.

As always, the UPRR should be contacted to obtain the latest copy of their guidelines. The address and telephone number of the Manager of Public Projects will be listed in Section 13 of the contract Special Provisions.

The general shoring requirements of the UPRR have been revised from the SPTC guidelines shown on Trenching and Shoring Memo page H-3-8 (SPTC Drawing ACAD\SP5, "Southern Pacific Lines Roadbed Profile Shoring Requirements", dated October 25, 1993). The minimum construction clearance and loading requirements for shoring adjacent to the UPRR tracks are shown on UPRR sheet C.E. 106613, "General Shoring Requirements", dated March 31, 1998. Refer to Attachment No. 1 for a copy of this drawing.

The contract special provisions will list the clearance requirements measured from the centerline of the railroad tracks. If clearances are not included in the contract documents, refer to UPRR Std. Dwg. 0035, "Barriers and Clearances to be Provided at Highway, Street, and Pedestrian Overpasses", dated March 31, 1998 for minimum construction clearance requirements. Refer to Attachment No. 2 for a copy of this drawing. This drawing shows the latest UPRR clearance requirements and will be incorporated into future contracts.

### Railroad Requirements

The UPRR requires the use of the Boussinesq equation to determine the minimum lateral pressure due to the Cooper E80 live load for shoring adjacent to their tracks for all UPRR and former SPTC lines. **The Cooper E80 railroad surcharge earth pressure curve allowed by the SPTC (shown as Chart 3.6 in Appendix C and other locations in the Trenching and**

**Shoring manual) is not allowed by the UPRR.** All references to the Chart 3.6 method of analysis should be discarded and the Boussinesq equation used. The application of the railroad surcharge shall be applied to the full depth of the shoring system.

Some common requirements are often overlooked and have resulted in submittals being returned by the railroad. The shoring plans should note how the contractor will gain access to the site, particularly if they must cross the railroad tracks. Track protection details are shown in the UPRR' s *GUIDELINES FOR PREPARATION OF A BRIDGE DEMOLITION AND REMOVAL PLAN FOR STRUCTURES OVER RAILROAD.*

The shoring plans should note if there are any existing drainage ditches or access roads being affected by the Contractor' s operations related to the shoring system. If there are no existing drainage facilities or access roads, the shoring drawings should note this fact. Keep in mind that personnel from the railroad who are unfamiliar with the site often review the shoring plans.

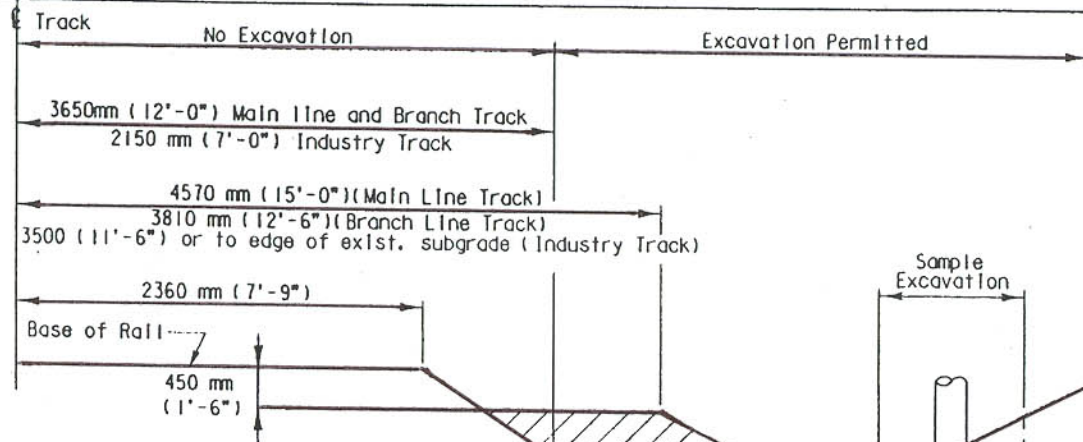
#### Railroad Review and Approval

The UPRR requires the submittal of a minimum of **five** sets of shoring plans and **three** sets of calculations and manufacturers' literature.

The UPRR has requested that drawings accompanying shoring plans be submitted on 11"x17" (279.4 mm x 431.8 mm) sized paper. Future special provisions will be revised to state this requirement. Until this request becomes a specification requirement, you should encourage that the contractor submit the five sets of shoring plans for railroad review on 11"x17" (279.4 mm x 431.8 mm) sized paper.

The above railroad requirements should be discussed at the pre-construction meeting with the Contractor. Approval of shoring plans adjacent to UPRR tracks will be contingent upon UPRR approving the plans. Note that the Contractor must not begin construction of any component of the shoring system within the railroad right-of-way until such time that railroad approval has been received.

#### Attachments



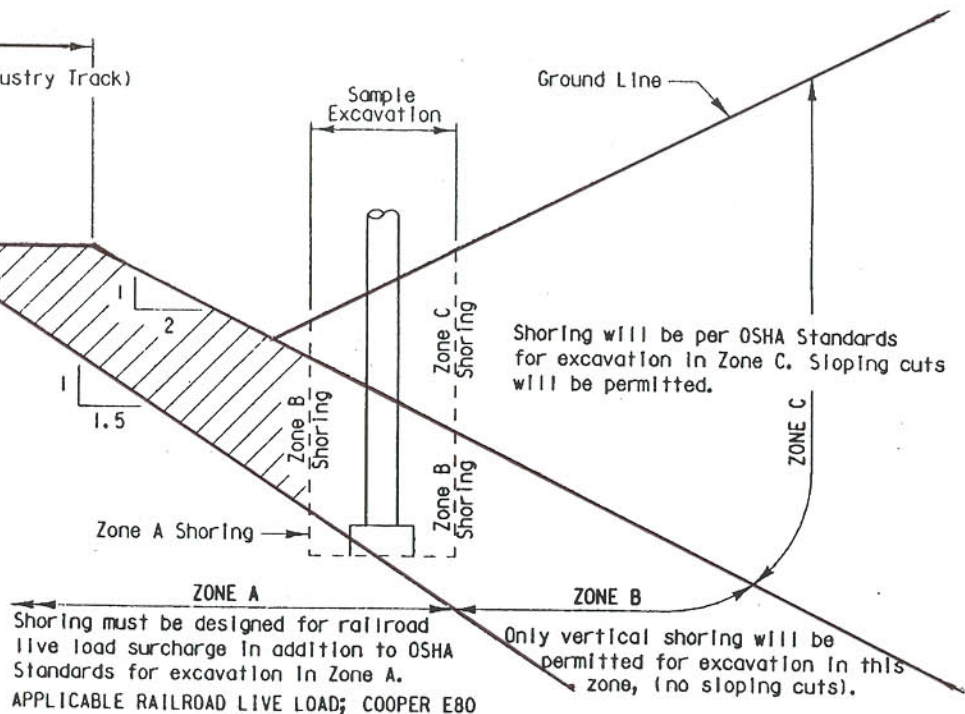
### TRACK PROTECTION SHORING:

All dimensions are measured perpendicular to  $\odot$  Track.  
The contractor shall provide and install track protection shoring before commencing excavation. Prior to commencing any work, the contractor shall submit for approval by the Engineer and UPRR, detailed plans indicating the nature and extent of the track protection shoring proposed.

Shoring shall be designed for Coopers E80 live load surcharge and the UPRR may impose more stringent requirements as conditions warrant.

For excavations which encroach into railroad live load surcharge zone, shoring plans will be accompanied by a copy of the design calculations, and both must be stamped by a registered professional engineer.

Design of shoring shall comply with UPRR guidelines for design and construction of shoring adjacent to active railroad tracks.



### TRACK PROTECTION SHORING REQUIREMENTS



# UNION PACIFIC RAILROAD

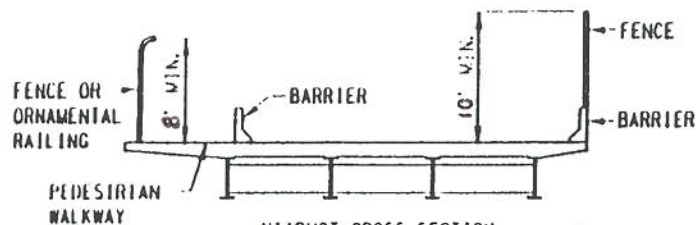
## GENERAL SHORING REQUIREMENTS

## OFFICE OF CHIEF ENGINEER DESIGN

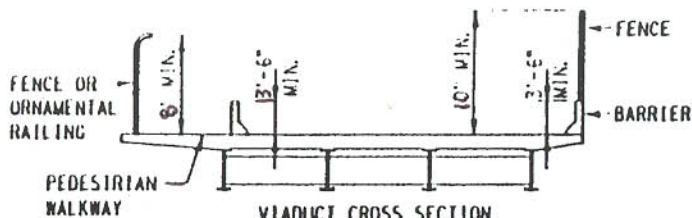
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C.E. 106613

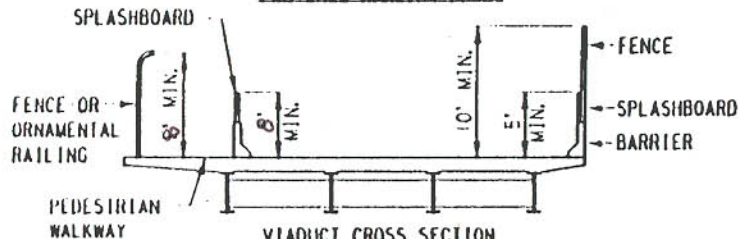




VIADUCT CROSS SECTION  
NO SNOW REMOVAL AREAS



VIADUCT CROSS SECTION  
WITH 3'-6" SOLID BARRIER AND FENCE  
FOR SNOW REMOVAL AREAS



VIADUCT CROSS SECTION  
WITH SPLASH BOARD AND FENCE  
FOR SNOW REMOVAL AREAS

#### GENERAL

Fence shall be provided as indicated on the cross sections and elevation view on both sides of the viaduct in ALL new or modified structures.

Splashboards or solid 3'-6" high barrier rail shall be provided as indicated on the cross sections and elevation view on both sides of the viaduct in ALL new or modified structures where snow removal is being performed.

Lights are to be installed on the underside of the viaduct where shadows cast by the structure would interfere with Railroad operations.

Slope paving shall be provided where end slopes equal to or exceed 2 horizontal to 1 vertical.

Falsework for construction of overhead structures shall comply to UPRR guidelines.

Demolition of existing overhead structures shall comply to UPRR guidelines.

Temporary shoring shall be designed in accordance with UPRR's Shoring Requirements (Drawing No. 106613) and UPRR guidelines.

Applicant shall be responsible for identification, location, and protection of existing utilities.

Contact UPRR's "Call Before You Dig" at least 48 hours prior to commencing work at 1-800-336-9193 to determine location of fiber optics.

Exceptions to these standards must be approved by UPRR's Chief Engineer Design.

#### CLEARANCES

Minimum vertical clearance shall be 23 feet above the plane of top-of-rails. Additional clearance may be required for construction purposes or if sag of vertical curve must be adjusted or if future track raise for flood considerations or maintenance is probable.

Minimum horizontal clearances, measured at right angle from centerline of track, shall be as shown in elevation view.

Minimum construction clearances shall be 21 feet vertical above the plane of top-of-rails; and 12 feet horizontal at right angle from centerline of track.

#### FUTURE TRACKS

Space is to be provided for one or more future tracks as required for long range planning or other operating requirements. Where provision is made for more than two tracks, space is to be provided for access road on both sides of tracks.

#### PIERS

Pier protection walls shall be provided in accordance with AREA Chapter 8, Part 2.5 for piers within 25 feet of the centerline of track.

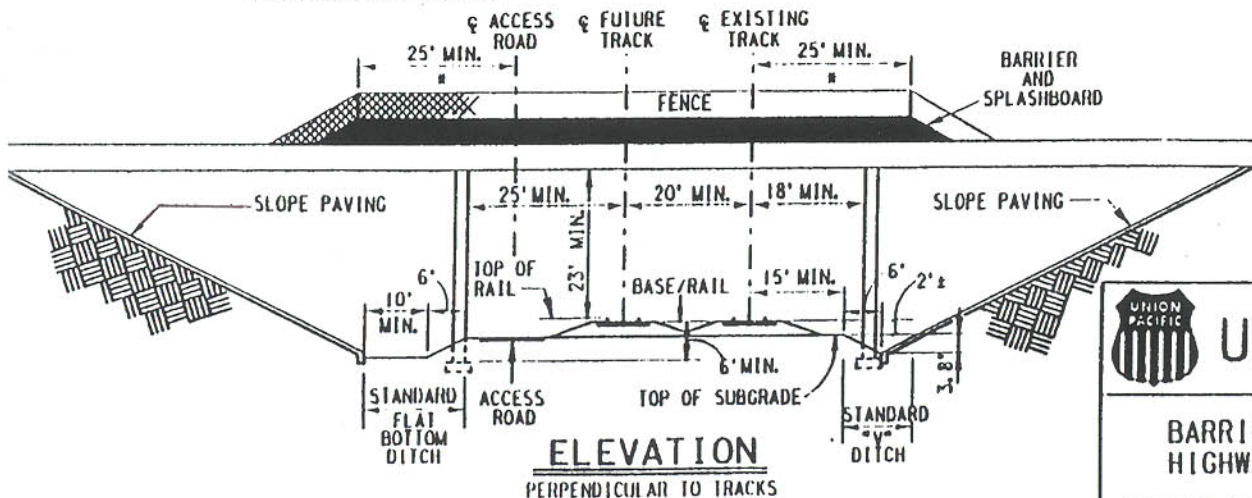
Top of footings within 25' from centerline of track shall be a minimum of 6 feet below base of rail and a minimum of 1 foot below flow line of ditch.

#### DRAINAGE

Drainage from the overpass shall be diverted away from UPRR's tracks and not discharged onto the tracks or roadbed.

A standard "V"-shaped or flat-bottom ditch shall be provided on each side of the tracks as necessary.

Culverts may be installed on opposite side of column from track in lieu of standard Railroad ditches when approved by Chief Engineer Design. Maintenance of culverts is to be at applicant's expense.



ELEVATION

PERPENDICULAR TO TRACKS

\* fences, splashboards, or solid barriers if required shall extend 25ft. beyond centerline of outer most track or access roadway.



UNION PACIFIC RAILROAD

BARRIERS AND CLEARANCES TO BE PROVIDED AT  
HIGHWAY, STREET, AND PEDESTRIAN OVERPASSES

OFFICE OF CHIEF ENGINEER DESIGN

REVISED: MAR. 31, 1998

STD. DWG. 0035